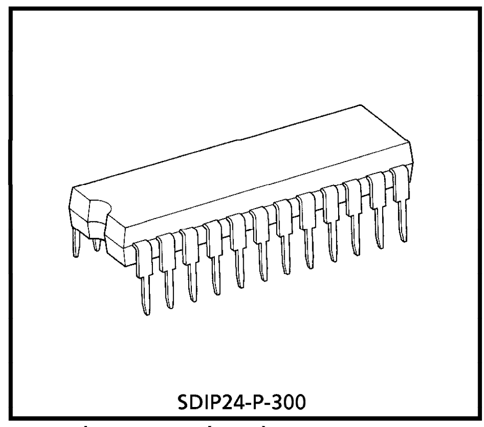
INTEGRATED CIRCUIT
TOSHIBA
TECHNICAL DATA

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT
TA8189N
SILICON MONOLITHIC

QUAD PREAMPLIFIER FOR DOUBLE CASSETTE TAPE RECORDER

The TA8189N is a Quad pre amplifier designed for use in record / play back amplifier. It is suitable for double cassette tape recorder.

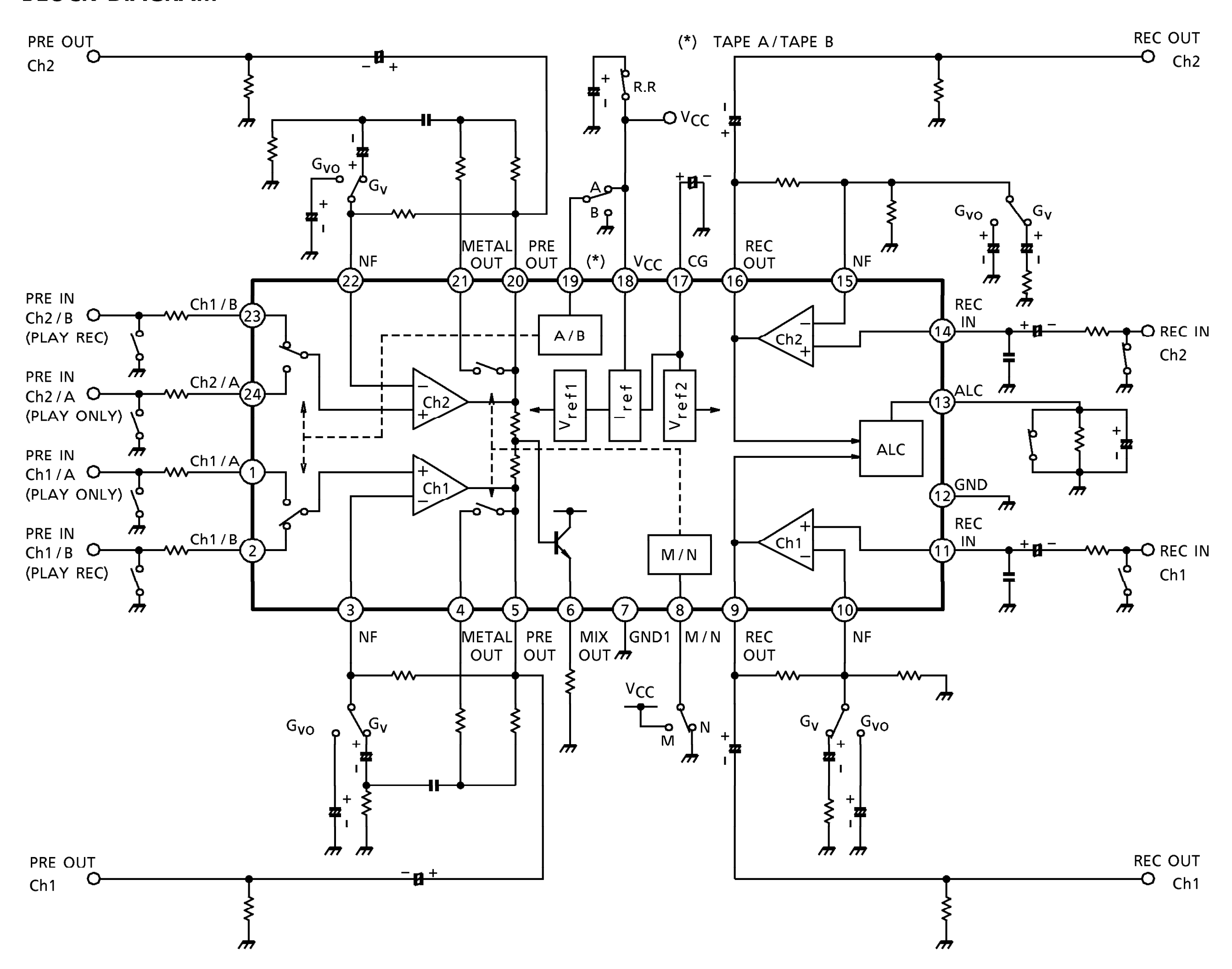

SDIP24-P-300

Weight : 1.2g (Typ.)

FEATURES

- Play back Amp
  - Built in input select switch.
  - Built in equalizer control switch.
  - Mixing output, for music selection.
- Recording Amp
  - Built in ALC detector circuit.
- Operating supply voltage range : $V_{CC\,(opr)} = 4.0 \sim 13.5V$ (Ta = 25°C)

BLOCK DIAGRAM



TERMINAL EXPLANATION

TERMINAL No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT
1	TAPE A IN (Ch1)	Tape play back input (PLAY)	
24	TAPE A IN (Ch1)		
2	TAPE B IN (Ch2)	Tape play back input (PLAY / REC)	
23	TAPE B IN (Ch2)		
3	PB NF (Ch1)	Tape play back NF	
22	PB NF (Ch2)		
4 / 21	METAL OUT	Metal EQ Switch	
5	PRE OUT (Ch1)	Play back Amp output	
20	PRE OUT (Ch2)		
6	MIX OUT	Mixing output	
7	GND	GND	—
8	METAL / NORMAL SW	Change over switch for metal mode and normal mode.	

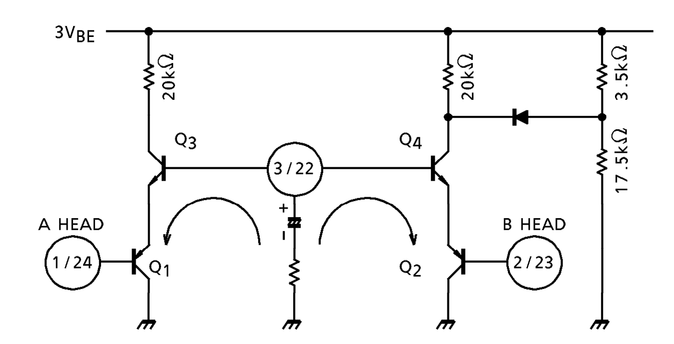
TERMINAL No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT
9	REC OUT (Ch1)	Recording Amp output	
16	REC OUT (Ch2)		
10	REC NF (Ch1)	Recording Amp NF	
15	REC NF (Ch2)		
11	REC IN (Ch1)	Recording Amp input	
14	REC IN (Ch2)		
12	GND	GND	—
13	ALC T.C	Automatic level Control (ALC) time constant terminal	
17	CG Det.	NF charge up circuit switching terminal	

TERMINAL No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT
19	TAPE A / TAPE B SW	Play back AMP input selector	V_{CC}, TAPE A Reg, TAPE B Reg, 19, GND

APPLICATION INFORMATION AND APPLICATION METHOD

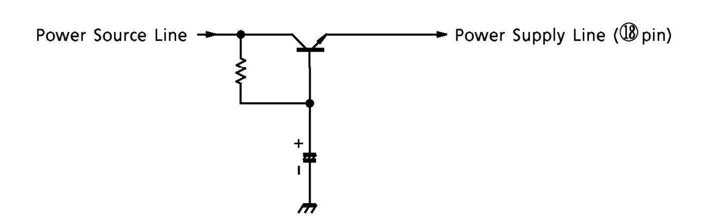
1. Input level of play amp.

   In case that input voltage (V_{in}>0.0245V_{rms} (−30dBm)) is applied to A-Head and B-Head at same time on a set, use A-Head for reproducing only and, B-Head for recording or reproducing.
   In case that the over-voltage is applied to A-Head and B-Head at same time, the Transistor Q_3, Q_4 are made a saturation condition and NF condenser is discharged by Base-current of Q_3, Q_4 and the output DC voltage of pin 3 / 22 are raised.
   In case of the high input, use B-Head, because of building in the diode against saturation on Q_4.



2. Power source line

   In case of including the Ripple on the power source line, stabilize by using a transistor as following figure.



MAXIMUM RATINGS ($Ta = 25°C$)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	14.5	V
Power Dissipation	P_D (Note)	1200	mW
Operating Temperature	T_{opr}	−20~75	°C
Storage Temperature	T_{stg}	−55~150	°C

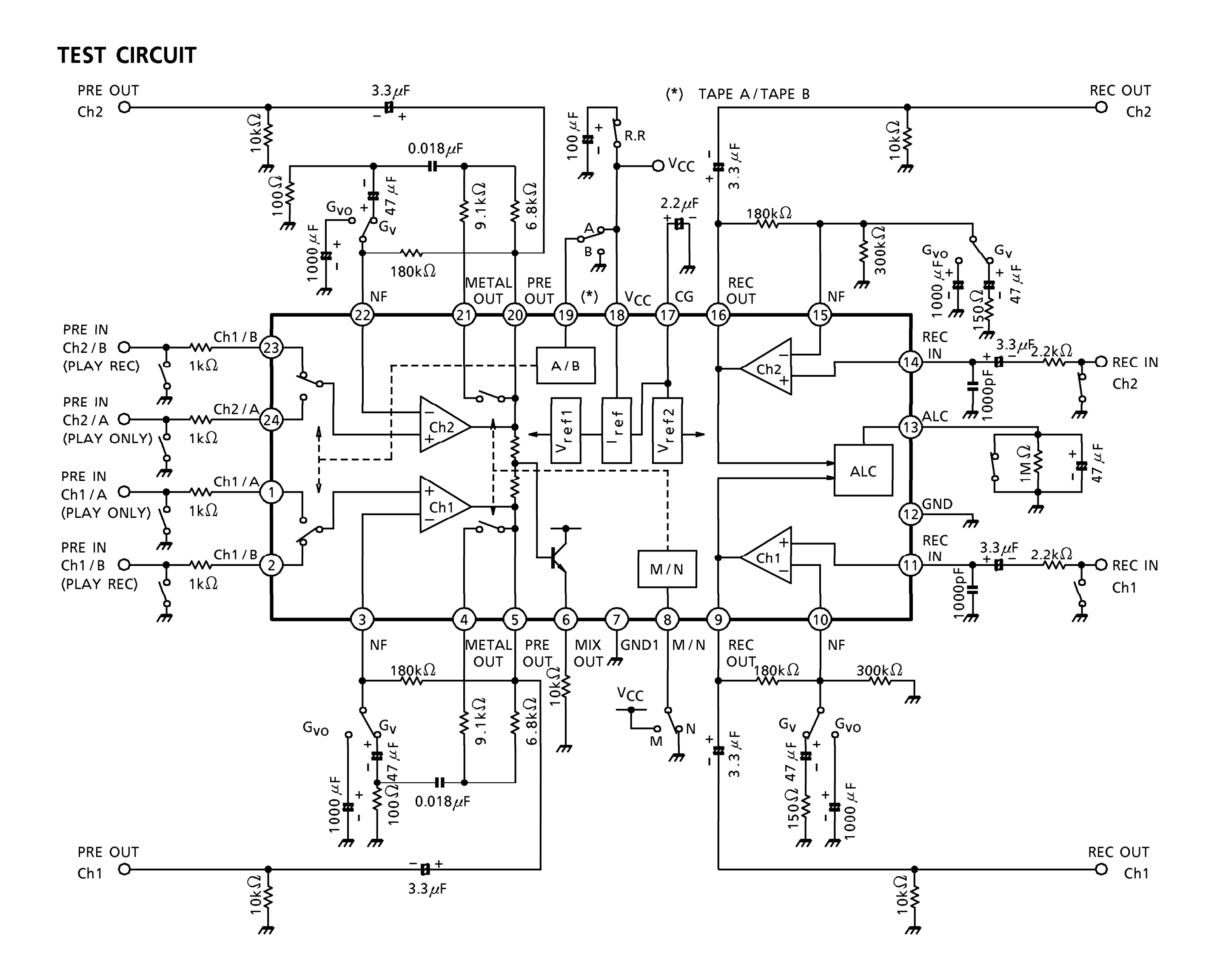
(Note) Derated above Ta = 25°C in the proportion of 9.6mW / °C.

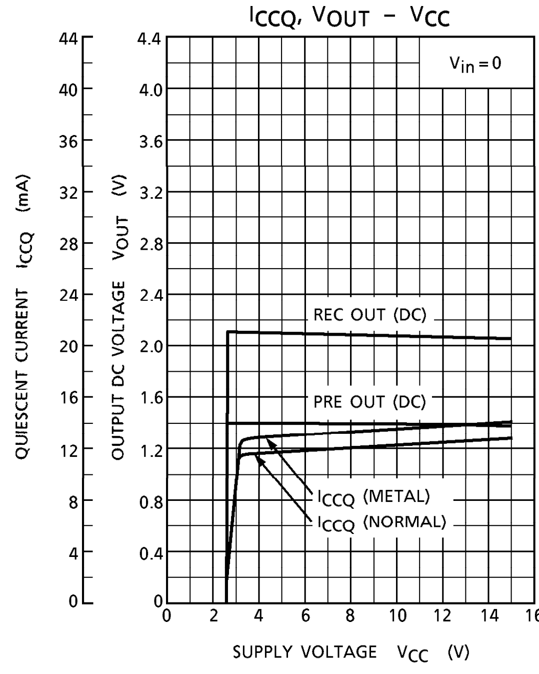
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{CC} = 6V$, f = 1kHz, Ta = 25°C)

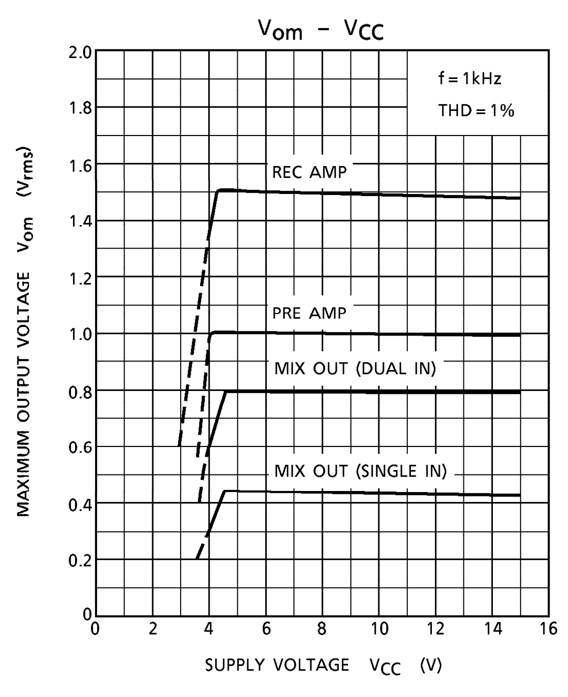
CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current		I_{CCQ}	—	METAL MODE, $V_{in} = 0$	—	13	20	mA
Play Back Amp.	Output Noise Voltage	V_{no}	—	NORMAL MODE, $R_g = 2.2k\Omega$, NAB EQ, BW = 20Hz~20kHz, $G_V = 40dB$	—	200	600	μV_{rms}
	Total Harmonic Distortion	THD	—	$V_{out} = 0.2V_{rms}$, f = 1kHz Normal mode	—	0.06	0.2	%
	Maximum Output Voltage	V_{om}	—	THD = 1.0%, $R_L = 10k\Omega$, f = 1kHz, NORMAL MODE	0.5	1.0	—	V_{rms}
	Open Loop Voltage Gain	G_{vo}	—	f = 1kHz, $R_L = 10k\Omega$, $V_{in} = 13.8\mu V$ (−95dBm)	70	95	—	dB
	Cross Talk	C.T. (Ch)	—	$V_{out} = 0.775V_{rms}$ (0dBm), f = 1kHz, $R_g = 2.2k\Omega$, NORMAL MODE	−40	−60	—	dB
	TAPE A / TAPE B Cross Talk	C.T. (IN)	—	$V_{out} = 0.775V_{rms}$ (0dBm), f = 1kHz, $R_g = 2.2k\Omega$, NORMAL MODE	—	−66	—	dB
	Ripple Rejection Ratio	R.R.	—	$V_{ripple} = 0.775V_{rms}$ (0dBm), $f_{ripple} = 100Hz$, $R_g = 2.2k\Omega$, NORMAL MODE	—	−38	—	dB
	Voltage Gain	G_{vn}	—	$V_{in} = 7.75mV_{rms}$ (−40dBm), f = 1kHz, $R_L = 10k\Omega$, NORMAL NAB	—	40	—	dB
Pre Amp →Rec Amp C.T.		C.T. (P / R)	—	f = 1kHz, V_{out} (PRE) = $0.775V_{rms}$ (0dBm), NORMAL (PRE)	—	−53	—	dB
Rec Amp →Pre Amp C.T.		C.T. (R / P)	—	f = 1kHz, V_{out} (REC) = $0.775V_{rms}$ (0dBm), NORMAL (PRE)	—	−76	—	dB

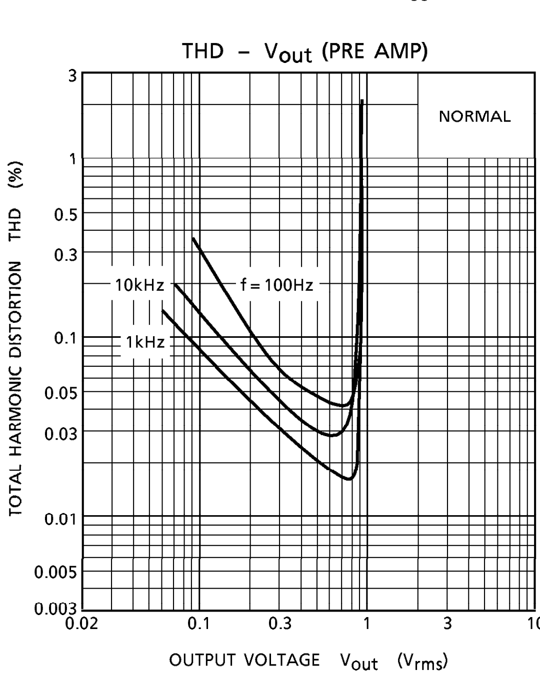
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Recording Amp.	Output Noise Voltage	V_{no}	—	$R_g = 2.2k\Omega$, BW = 20Hz~20kHz, ALC OFF $G_V = 60dB$	—	1.35	2.7	mV
	Total Harmonic Distortion	THD	—	$V_{out} = 0.5V_{rms}$, f = 1kHz, ALC OFF $R_L = 10k\Omega$	—	0.37	1.0	%
	Maximum Output Voltage	V_{om}	—	THD = 1%, $R_L = 10k\Omega$, f = 1kHz, ALC OFF	1.2	1.5	—	V_{rms}
	Open Loop Voltage Gain	G_{vo}	—	f = 1kHz, $R_L = 10k\Omega$, ALC OFF, $V_{in} = 3.16\mu V_{rms}$ (−110dBV)	80	108	—	dB
	ALC Range	R (ALC)	—	3dB up, f = 1kHz, dual input	—	52	—	dB
	Total Harmonic Distortion (ALC)	THD (ALC)	—	$V_{in} = 0.0775V_{rms}$ (−20dBm), f = 1kHz dual input, $R_L = 10k\Omega$	—	0.48	1.0	%
	ALC Balance	B (ALC)	—	$V_{in} = 0.0775V_{rms}$ (−20dBm), dual input, $R_L = 10k\Omega$, f = 1kHz	—	0	2	dB
	ALC Level	V (ALC)	—	$V_{in} = 0.0775V_{rms}$ (−20dBm), f = 1kHz, $R_L = 10k\Omega$	0.75	1.0	1.2	V_{rms}
	Ripple Rejection Ratio	R.R.	—	$V_{ripple} = 0.775V_{rms}$ (0dBm), f = 100Hz, $R_g = 2.2k\Omega$	—	−30	—	dB
	Voltage Gain	G_{vn}	—	f = 1kHz (FLAT), $R_L = 10k\Omega$, $V_{in} = 1mV_{rms}$ (−60dBV)	—	61	—	dB
	Cross Talk (ALC OFF)	C.T. (Ch)	—	$V_{out} = 0.775V_{rms}$ (0dBm), f = 1kHz, $R_g = 2.2k\Omega$ ALC OFF, $V_{in} = 1mV_{rms}$ (−60dBV)	−40	−54	—	dB
	Cross Talk (ALC ON)	C.T. (ALC)	—	$V_{out} = 0.775V_{rms}$ (0dBm), f = 1kHz, $R_g = 2.2k\Omega$, ALC ON, $V_{in} = 0.0775V_{rms}$ (−20dBm)	−40	−54	—	dB

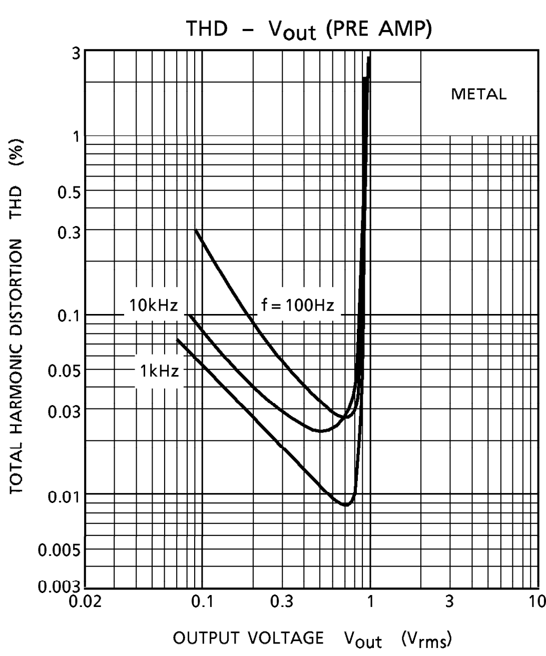
TEST CIRCUIT




ICCQ, VOUT – VCC
Vin = 0
REC OUT (DC)
PRE OUT (DC)
ICCQ (METAL)
ICCQ (NORMAL)
QUIESCENT CURRENT ICCQ (mA)
OUTPUT DC VOLTAGE VOUT (V)
SUPPLY VOLTAGE VCC (V)


Vom – VCC
f = 1kHz
THD = 1%
REC AMP
PRE AMP
MIX OUT (DUAL IN)
MIX OUT (SINGLE IN)
MAXIMUM OUTPUT VOLTAGE Vom (Vrms)
SUPPLY VOLTAGE VCC (V)


THD – Vout (PRE AMP)
NORMAL
10kHz
f = 100Hz
1kHz
TOTAL HARMONIC DISTORTION THD (%)
OUTPUT VOLTAGE Vout (Vrms)


THD – Vout (PRE AMP)
METAL
10kHz
f = 100Hz
1kHz
TOTAL HARMONIC DISTORTION THD (%)
OUTPUT VOLTAGE Vout (Vrms)

THD – V_{out} (MIX OUT)

NORMAL
DUAL IN

f = 100Hz
10kHz
1kHz

TOTAL HARMONIC DISTORTION THD (%)
OUTPUT VOLTAGE V_{out} (V_{rms})

Y axis: 0.05, 0.1, 0.3, 0.5, 1, 3, 5, 10
X axis: 0.02, 0.1, 0.3, 1, 3

THD – V_{out} (REC AMP)

ALC OFF

f = 10kHz
100Hz
1kHz

TOTAL HARMONIC DISTORTION THD (%)
OUTPUT VOLTAGE V_{out} (V_{rms})

Y axis: 0.05, 0.1, 0.3, 0.5, 1, 3, 5, 10
X axis: 0.02, 0.1, 0.3, 1, 3

V_{out}, THD – V_{in} (REC AMP)

f = 1kHz
DUAL IN
ALC ON

V_{OUT}
THD

OUTPUT VOLTAGE V_{out} (V_{rms})
TOTAL HARMONIC DISTORTION THD (%)
INPUT VOLTAGE V_{in} (dB)

Y axis: 0.05, 0.1, 0.3, 0.5, 1, 3, 5, 10
X axis: –80, –70, –60, –50, –40, –30, –20, –10, 0.775V_{rms} (0dBm)

G_{VO} – f (PRE AMP)

V_{out} = 0.775V_{rms}
(0dBm)

OPEN LOOP VOLTAGE GAIN G_{VO} (dB)
FREQUENCY f (Hz)

Y axis: 30, 40, 50, 60, 70, 80, 90, 100, 110, 120
X axis: 30, 100, 300, 1k, 3k, 10k, 30k, 100k

G_V – f (PRE AMP)

V_{in} = 7.75mV_{rms}
(–40dBm)

NORMAL
METAL

VOLTAGE GAIN G_V (dB)
FREQUENCY f (Hz)

Y axis: 0, 10, 20, 30, 40, 50, 60, 70, 80
X axis: 30, 100, 300, 1k, 3k, 10k, 30k, 100k

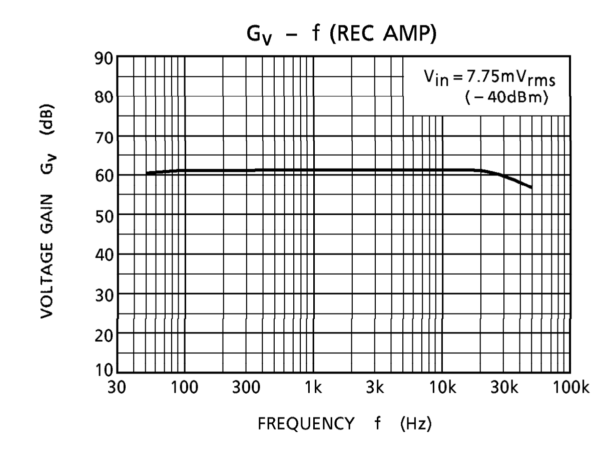
G_V – f (MIX OUT)

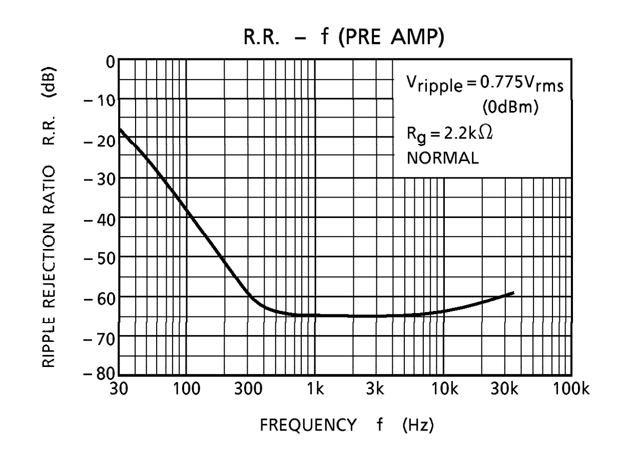
V_{in} = 7.75mV_{rms}
(–40dBm)

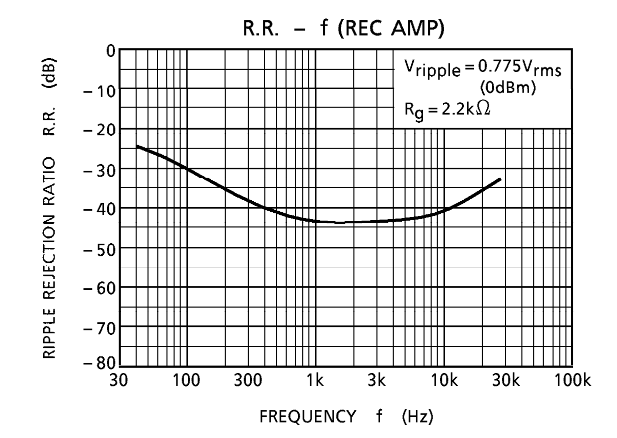
DUAL IN
SINGLE IN

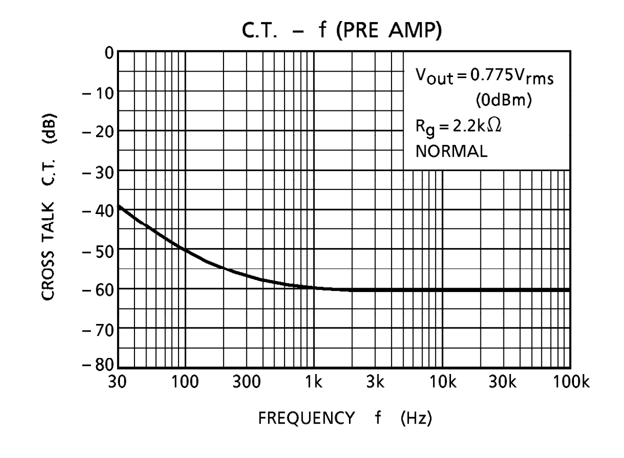
VOLTAGE GAIN G_V (dB)
FREQUENCY f (Hz)

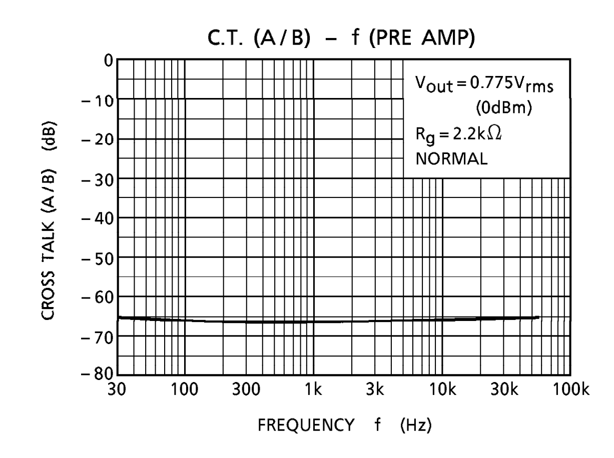
Y axis: 0, 10, 20, 30, 40, 50, 60, 70, 80
X axis: 30, 100, 300, 1k, 3k, 10k, 30k, 100k

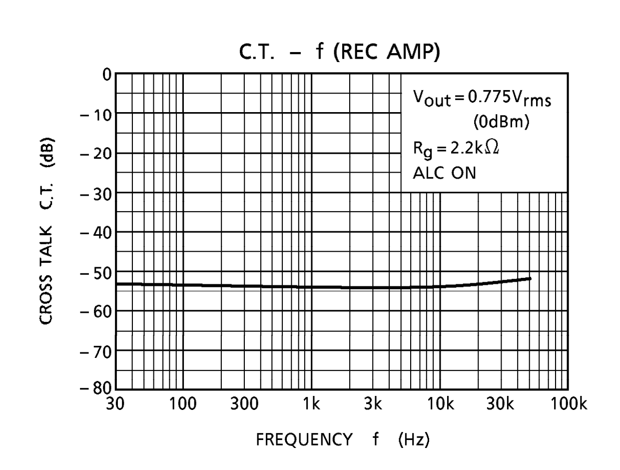

G_V – f (REC AMP)
V_{in} = 7.75mVrms (−40dBm)
VOLTAGE GAIN G_V (dB)
90 80 70 60 50 40 30 20 10
30 100 300 1k 3k 10k 30k 100k
FREQUENCY f (Hz)

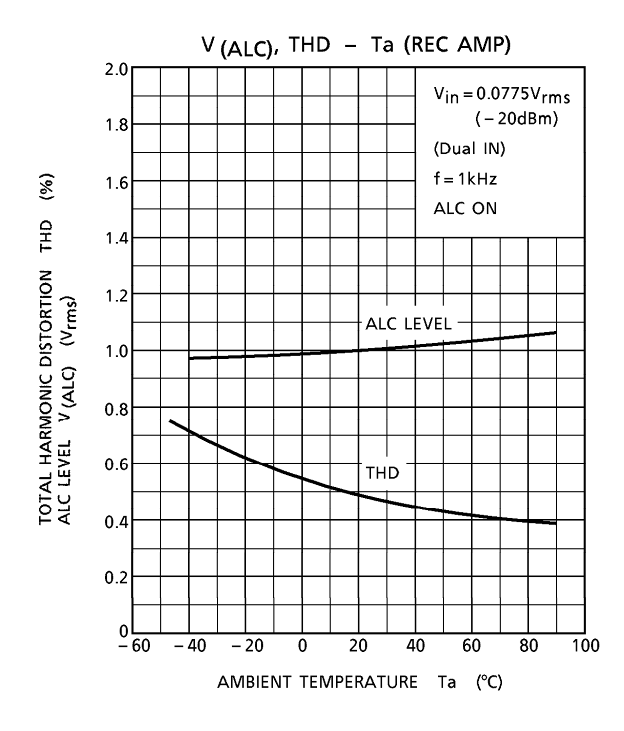

R.R. – f (PRE AMP)
V_{ripple} = 0.775Vrms (0dBm)
R_g = 2.2kΩ
NORMAL
RIPPLE REJECTION RATIO R.R. (dB)
0 −10 −20 −30 −40 −50 −60 −70 −80
30 100 300 1k 3k 10k 30k 100k
FREQUENCY f (Hz)

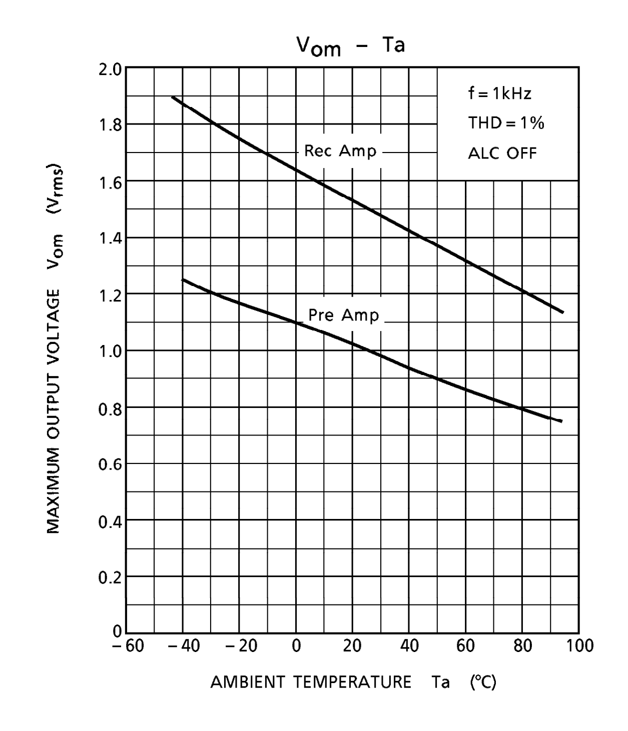

R.R. – f (REC AMP)
V_{ripple} = 0.775Vrms (0dBm)
R_g = 2.2kΩ
RIPPLE REJECTION RATIO R.R. (dB)
0 −10 −20 −30 −40 −50 −60 −70 −80
30 100 300 1k 3k 10k 30k 100k
FREQUENCY f (Hz)

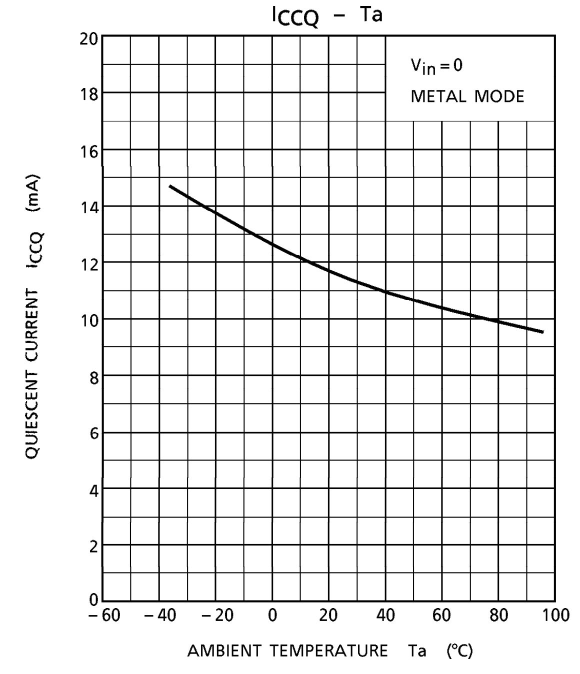

C.T. – f (PRE AMP)
V_{out} = 0.775Vrms (0dBm)
R_g = 2.2kΩ
NORMAL
CROSS TALK C.T. (dB)
0 −10 −20 −30 −40 −50 −60 −70 −80
30 100 300 1k 3k 10k 30k 100k
FREQUENCY f (Hz)


C.T. (A / B) – f (PRE AMP)
V_{out} = 0.775Vrms (0dBm)
R_g = 2.2kΩ
NORMAL
CROSS TALK (A / B) (dB)
0 −10 −20 −30 −40 −50 −60 −70 −80
30 100 300 1k 3k 10k 30k 100k
FREQUENCY f (Hz)


C.T. – f (REC AMP)
V_{out} = 0.775Vrms (0dBm)
R_g = 2.2kΩ
ALC ON
CROSS TALK C.T. (dB)
0 −10 −20 −30 −40 −50 −60 −70 −80
30 100 300 1k 3k 10k 30k 100k
FREQUENCY f (Hz)


V (ALC), THD – Ta (REC AMP)
Vin = 0.0775Vrms
(–20dBm)
(Dual IN)
f = 1kHz
ALC ON
ALC LEVEL
THD
TOTAL HARMONIC DISTORTION THD (%)
ALC LEVEL V (ALC) (Vrms)
AMBIENT TEMPERATURE Ta (°C)


Vom – Ta
f = 1kHz
THD = 1%
ALC OFF
Rec Amp
Pre Amp
MAXIMUM OUTPUT VOLTAGE Vom (Vrms)
AMBIENT TEMPERATURE Ta (°C)

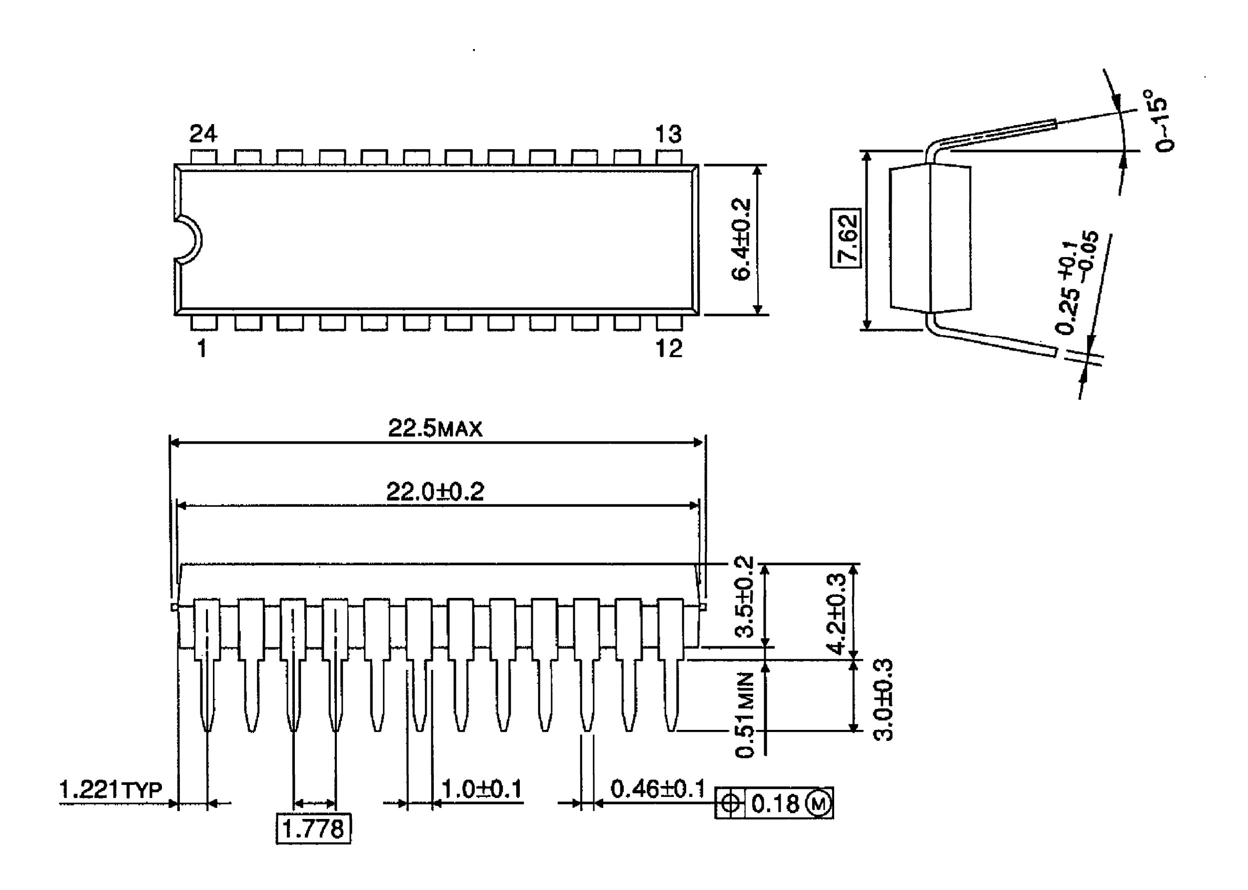

ICCQ – Ta
Vin = 0
METAL MODE
QUIESCENT CURRENT ICCQ (mA)
AMBIENT TEMPERATURE Ta (°C)

APPLICATION CIRCUIT



OUTLINE DRAWING
SDIP24-P-300

Unit : mm



Weight : 1.2g (Typ.)